weight limitations of the claims differentiated the claims from the cited art, but because the Examiner was unable to locate the file at the time of the interview, he indicated that he would have to verify that the recited limitations were not anticipated by the cited references.

Rejections under 35 U.S.C § 102(b)

Claims 1-8 were rejected as anticipated by U.S. Patent No. 4,915,785 issued to Siminoski et al. (hereinafter "Siminoski et al.") or by Pulp and Paper Canada article by Robitaille (hereinafter "Robitaille"). The Office Action alleges that the compositions disclosed by Siminoski et al. and Robitaille anticipate the present composition as claimed. The applicants respectfully traverse these rejections. Claim 1 recites:

> A combination of additives for use in a brightening stage of pulps containing less than 18% lignin, said combination comprising: an aqueous solution of sodium silicate; an alkali agent added in an amount sufficient to maintain a pH of said solution at least about 8; and a magnesium compound which dissociates in said solution to form $Mg(OH)^+$ cations, wherein said magnesium compound is added in an amount to achieve, along with any other dissociated magnesium, an $Mg:SiO_2$ mass ratio of between about 1:15 to about 1:2, and wherein at least 25% of the silicates have a molecular weight of at least 10,000 Daltons.

In regards to the $Mg:SiO_2$ mass ratio, Siminoski et al. disclose compositions comprising silicate and magnesium in which the highest $Mg: SiO_2$ ratio is 1:16 (first composition of Table 1). In this example, a composition of 6 weight percent 41° Be sodium silicate solution is present with 0.54 weight percent magnesium sulfate. Since 41° Be sodium silicate solution is a commercially available solution of 28.7% silicate, and magnesium is 20% by atomic weight of $MgSO_4$, the composition is 0.108 % Mg and 1.7 % silicate, resulting in a $Mg:SiO_2$ mass ratio of 1:16. Thus the highest

Mg:SiO_2 mass ratio composition disclosed by Siminoski et al. has a mass ratio less than the smallest ratio (1:15) set forth in claims 1-8.

The Office Action indicated at page 4, second paragraph, that Siminoksi et al. report the use of same compounds in the same ratios as that claimed in the present invention. Specifically, the Office Action states that Table 1 of the instant specification "expresses the weight of Mg and silicate as the compound and not the element." The applicants respectfully disagree and have included a copy of Table 1 from page 12 of the specification for the Examiner's convenience to illustrate that Table one does indeed express the weight percent of Mg element, and expresses the weight percent of SiO_2 specifically, as well as the weight percents of $MgSO_4 \cdot 7H_2O$ and Silicate solution. Additionally, Table 1 provides the calculated Mg:SiO_2 mass ratio for each sample.

Furthermore, Siminoski et al. are not reporting the same compounds by weight (Simonski et al. report % on pulp of $MgSO_4$ whereas the instant specification reports % on pulp of $MgSO_4 \cdot 7H_2O$) and the compounds are not in the same ratios. The Mg:SiO_2 mass ratios disclosed in Simonski et al. differ from the ratios claimed in the instant application, as detailed below.

The Mg:SiO_2 mass ratios for the treatment compositions are not provided in Siminoksi et al., however these ratios are easily calculated from the percent weight on pulp given for the various compounds and atomic weights available from any periodic table. For the Examiner's convenience, a copy of a table of atomic weights is provided herein from the Merck Index, 11th edition.

Of all the Examples provided in Siminsoki et al., the first composition in Table 1 has the highest possible Mg:SiO_2 mass ratio, as 0.54 % $MgSO_4$ is combined with 6% 41° Bé silicate solution. The Mg:SiO_2 mass ratio of this composition is calculated as follows:

Siminoski et al, Table 1, first composition:

1. 41° Bé silicate solution is a 28.7% SiO_2 solution. 6% Bé silicate solution on pulp X 28.7% SiO_2 = 1.7% SiO_2 on pulp.

2. 0.54% $MgSO_4$ on pulp: Molecular weight of $MgSO_4$ = 24 [Mg] + 32 [S] + (4 X 16) [O_4] = 120. $Mg/MgSO_4$ = 24/120=0.20. (0.02 $Mg/MgSO_4$) X 0.54% $MgSO_4$ on pulp = 0.108% Mg on pulp.

3. Mass ratio of 0.108 % Mg on pulp: 1.7% SiO_2 on pulp = 1:16 Mg:SiO_2.

Thus, the highest Mg:SiO_2 ratio disclosed by Siminoski et al. is 1:16. The instant claims recite a Mg:SiO_2 ratio between about 1:15 and 1:2, thus Siminoski et al. do not disclose or suggest the invention of the instant claims.

Similarly, Robitaille does not report Mg:SiO_2 mass ratios per se, but the ratio is easily calculated for the only Robitaille composition reported that contains silicate and $MgSO_4$. Robitaille provides a composition in Table II, middle column that contains 1.0% on pulp Sodium Silicate (Na_2SiO_3) and 0.1% on pulp $MgSO_4$.

Robitaille, Table II, Middle column:

1. 1.0% Na_2SiO_3: Molecular weight of Na_2SiO_3= (2 X 23) [Na_2] + 28 [Si] + (3 X 16) [O_3] = 122. Molecular weight of SiO_2 = 28 [Si] + (2 X 16) [O_2] = 60. SiO_2/Na_2SiO_3 =60/122= 0.49 SiO_2/Na_2SiO_3. 0.49 SiO_2/Na_2SiO_3 X 1.0% Na_2SiO_3 on pulp = 0.49% SiO_2 on pulp.

2. 0.1% $MgSO_4$: Molecular weight of $MgSO_4$ = 24 [Mg] + 32 [S] + (4 X 16) [O_4] = 120. $Mg/MgSO_4$ = 24/120=0.20. (0.02 $Mg/MgSO_4$) X 0.1% $MgSO_4$ on pulp = 0.02% Mg on pulp.

3. Mass ratio of 0.02 % Mg on pulp: 0.49% SiO_2 on pulp = 1:24.5 Mg:SiO_2.

Thus, the only Mg:SiO_2 ratio disclosed by Robitaille is 1:24.5. The instant claims recite a Mg:SiO_2 ratio between about 1:15 and 1:2, thus Robitaille does not disclose or suggest the invention of the instant claims.

Furthermore, claims 1-23 recite that *at least 25% of the silicates have a molecular weight of at least 10,000 Daltons*. Claim 24 specifies a sodium silicate solution having a high percentage of high molecular weight silicates. It is respectfully submitted that none of the cited references disclose or suggest the invention as claimed, which includes at least 25% of the silicates have a molecular weight of at least 10,000 Daltons. The large molecular weight silicates provides adequate absorption of the high Mg ratio to achieve the desired brightening properties of the instant invention. There is no teaching, or suggestion of high molecular weight silicates in any of the cited references. For this alone, the instant claims are patentable over the cited art.

Claims 1-25 were also rejected under 35 U.S.C § 102(b) as anticipated by, or in the alternative under 35 U.S.C § 103(a) as obvious over Francis. This rejection is based on art that was not at any time published, or available to the public. The cited document was an internal communication between the co-inventors. The document by Dr. Francis was submitted to National Silicates Ltd., which is an assignee of the present invention. The February 7, 1997 date that appears on the document cover sheet merely reflects the date the document was submitted to National Silicates Ltd., and in no way represents a publication date, or public disclosure date. Because the cited art is not applicable under 35 U.S.C § 102, the applicants respectfully request withdrawal of this rejection.

A Declaration by Raymond C. Francis is enclosed herewith and states that the Interim Report he submitted to National Silicates Ltd. in February 1997 was an internal communication between research collaborators that was not intended to be publicly disclosed in any manner. He further states that to his knowledge, the Interim Report was not published, distributed, or disclosed outside of the research collaboration of National Silicates Ltd. and the State University of New York, Syracuse.

Rejections under 35 U.S.C § 103(a)

Claims 1-8 were rejected as obvious over Siminoski et al. or Robitaille. The Office Action alleges that any differences in the percentages of the compositions disclosed by Siminoski et al. and Robitaille would have been obvious to achieve

brightness depending on the type of pulp being brightened. Applicants respectfully traverse these rejections. The cited art teach away from the present invention in that LOWER Mg:SiO_2 ratios increase brightening. The present invention uses HIGHER Mg:SiO_2 ratios to achieve increased brightening of pulp. The increase in pulp brightness accompanies higher Mg:SiO_2 ratios in the composition of the present invention as at least 25% of the silicates are at least 10,000 Daltons.

Siminoski et al.

Table 1 of Siminoski et al. teaches that as the amount of silicate is increased relative to a constant amount of Magnesium (i.e. a decreasing Mg:SiO_2 ratio), pulp brightness systematically increases. Applicants pursued Mg:SiO_2 ratios greater than the lowest Mg:SiO_2 ratio of Siminoski et al. DESPITE the teachings of Siminoski et al., and proceeded to show the unexpected results of increased pulp brightness with an increasing Mg:SiO_2 ratio. Thus, it would not have been obvious to one of ordinary skill in the art to modify the compositions of Siminoski et al. to achieve the present invention.

Robitaille

The disclosure of Robitaille, also teaches away from the Mg:SiO_2 mass ratio as claimed, and furthermore, teaches away from the inclusion of Mg and SiO_2 entirely. Robitaille states that mill runs were conducted without the stabilizers ($MgSO_4$ and Na_2SiO_3), with unchanged results; "Mill experience quickly proved that stabilizers were indeed unnecessary to achieve a significant increase in brightness." (page 412, third column) The applicants have proceeded contrary to the teachings of Robitaille in achieving a composition comprising magnesium sulfate and silicate.

Furthermore, the only Mg:SiO_2 ratio disclosed by Robitaille, as calculated above, is 1:24.5 which is significantly outside the range of 1:2 to 1:15 recited in the present claims. Since Robitaille teaches that stabilizers are generally unnecessary, and disclose only an example that is clearly outside the mass ratio of the present invention, the present claims are non-obvious over Robitaille alone, or in combination with the other cited art.

Robitaille in view of AU 567,787 or Singh

Claims 9-20 were rejected as obvious over EP 622,491 in view of Robitaille, in view of AU 567,787 or Singh with or without the admitted prior art. Applicants respectfully traverse this rejection.

The Office Action alleges that Australian Patent 567,787 teaches bleaching of a chemical pulp, and that it would be obvious to use a bleaching liquor as taught in Robitaille to bleach chemical pulp. Applicants respectfully disagree with this allegation for the following reasons.

None of the cited art or the admitted prior art in the specification disclose or suggest a $Mg:SiO_2$ ratio as recited in claims 9-20 in a composition for brightening chemical pulp. Additionally, none of the cited art disclose or suggest the use of silicates of molecular weight at least 10,000 Daltons.

Robitaille in view of AU 567,787 or Singh, in view of Tibbling et al.

Claims 21-25 were rejected as obvious over Robitaille, in view of AU 567,787 or Singh with or without the admitted prior art, further in view of Tibbling et al. Applicants respectfully traverse this rejection.

Claim 25 was canceled by way of Article 34 during PCT examination, rendering this rejection moot. The Office Action alleges that Tibbling et al. teach peroxide bleaching of chemical pulp by conducting the peroxide bleaching under oxygen gas pressure. Tibbling et al. provide no disclosure of a brightening method using Mg and Silicate. Since Robitaille teaches away from including Mg and SiO_2 in pulp processing, and Tibbling et al. are silent regarding the use of silicates in a method for brightening pulp, one of ordinary skill in the art would not arrive at the present invention as set forth in claims 21-24 by the combined teachings of Robitaille and Tibbling et al. with or without the admitted prior art. Applicants respectfully request withdrawal of the rejections under § 103 for the reasons set forth above.

In view of the foregoing amendments and remarks, the applicants respectfully request reconsideration and allowance of this application.

Respectfully submitted,

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PDP/
Enclosures: Declaration of Raymond C. Francis;
Page 13, Table 1 of specification;
Table of Atomic Weights.

Dated: September 23, 2002

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